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Psychological Evaluation of Young Women after Medical Treatment for Central Precocious Puberty

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Key Words
Precocious puberty · GnRH agonists · Long-term psychological effects

Abstract
Objective: This study aimed at the evaluation of the subjective experience and long-term behavioral and psychological effects of precocious puberty (PP). ***Methods:*** 19 female patients who had been treated with GnRH agonists participated in a semistructured interview and completed two standardized checklists. Their parents completed the Child Behavior Checklist (CBCL). ***Results:*** The CBCL yielded significantly elevated Internalizing and Total Behavior Problem scores. An elevated risk was found for patients with short adult stature and a relatively late onset of PP. The latter tended to neuroticism, to accentuation of their physical appearance, and felt significantly more insecure than age-related non-PP girls. ***Conclusion:*** Our findings suggest that PP can lead to specific behavioral problems, and that patients with a risk factor may need psychosocial support.

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Introduction

Precocious puberty (PP) in girls is usually of central origin. In these patients maturation is induced by premature activation of the gonadotropin-releasing hormone (GnRH) secretion. Children with PP have an initial rapid growth phase with accelerated skeletal maturation which leads to an early growth arrest with limited final height. Gonadotropin secretion can be suppressed by GnRH agonists, which are widely used in the treatment of central PP.

The effects of GnRH analogues on growth and pubertal development have often been described [1], but only a few studies deal with the psychological aspects of PP. These studies have primarily analyzed possible consequences on behavior or intelligence. While intelligence appears not to be influenced by PP [2–4], the findings on increased behavioral problems are controversial. Sonis et al. [5] reported that 27% of their patients had behavior problems. In contrast, three other studies observed a much smaller percentage [3, 4, 6]. A few studies investigated emotional and psychosocial aspects of PP. Retrospective studies described withdrawal [5], shyness [7, 8], affective instability [9], but only minor effects on body image.

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Table 1. Medical and demographic data of girls with central PP

Number		19
Onset of PP, years	Mean age (± SD)	4.5 (1.9)
	Range	1.5–8.0
Cranial CT/MRI	Normal	10
	Small hamartoma	2
	Not done	7
Therapy, years	Start (mean ± SD)	5.8 (2.2)
	End (mean ± SD)	10.5 (1.4)
GnRH agonist	Buserelin (intranasal)	12
	Triptorelin (i.m.)	7
Menstruation, years	(Re-)appearance (mean ± SD)	12.0 (1.1)
Age at interview, years	Mean (± SD)	18.1 (2.7)
	Range	14.3–21.9
Final height, cm (n = 17)	Mean (± SD)	160.9 (6.7)
	Range	147–178
Target height, cm (n = 17)	Mean (± SD)	161.8 (5.5)
	Range	149–172
Adopted in infancy	(Country of origin: India)	2
Socioeconomic status	Low	2
	Middle	11
	High	6

Hitherto existing studies suggested that PP may have long-term effects on behavior and emotional adjustment, and may affect patients' experience of their own bodies. In the present study we aimed at evaluating the subjective experience of PP and its medical treatment, as well as the possible emotional and behavioral effects.

Methods

Patients

The patients were recruited from the records of five Swiss hospitals where they had been treated for PP. They and their parents were first contacted by the pediatric endocrinologists who originally treated them, were informed about the project and asked to participate in this study. Inclusion criteria were an age range of 14–22 years, and absence of neurological abnormalities. All of the contacted patients and their parents agreed to participate by written informed consent, with the exception of 2 patients who felt uncomfortable talking about these issues. Information about the onset of puberty was taken from the medical records. Sociodemographic and medical characteristics of the 19 patients studied are listed in table 1. Intranasal or intramuscular treatment with GnRH agonists was terminated at least 2 years prior to the evaluation. In 2 cases, magnetic resonance imaging revealed a small subhypothalamic hamartoma. Mean values and standard deviations of final height were calculated after exclusion of the 2 adopted patients. Mean final height of all 19 patients was 159.4 ± 7.8 cm.

Measures

Interview: In order to assess patients' subjective experience of PP, a semistructured interview with 80 questions was developed. The interview took about 1 h, was conducted with the patients (separate from their parents), and included questions about the patients' experience of medical therapy. Furthermore, it explored the areas of the affective and physical impact of PP, and how the patients were able to cope with maturational processes and tall stature caused by the early growth spurt.

Child Behavior Checklist (CBCL): The CBCL [10] is a well-standardized and frequently used measure with excellent psychometric properties. It consists of 120 items which were completed by the parents, providing information about the behavior of their child. The items yield scores for eight syndrome subscales (1 social withdrawal, 2 somatic complaints, 3 anxiety/depression, 4 social problems, 5 thought problems, 6 attention problems, 7 delinquent behavior, 8 aggressive behavior). Subscales 1–3 add up to the Internalizing problem behavior scale. Subscales 7 and 8 are summed up in the Externalizing behavior scale. Finally, the overall Total problem behavior score consists of all 120 items. The 8 syndrome subscales were not used in this study. For defining of the patients as clinically deviant, the cut-off point on the Total, the Internalizing and the Externalizing score was set at T = 60. Norms were provided by a large community sample of German female adolescents [11].

Eysenck Personality Inventory (EPI): The EPI was the first of two checklists completed by the patients. It consists of 57 items that add up into three scales (Neuroticism, Extraversion and Lie scale). The EPI [12] is a well-validated measure of important aspects of personality. The Extraversion scale assesses the degree of sociability and impulsiveness in a person, the Neuroticism scale is a measure of emotional instability. The Lie scale contains several questions which disclose whether the patients try to present themselves in a good light. If three or more of these questions are answered with 'yes', the Lie scale is considered to be elevated. Such answers indicate the patients' desire to feel socially accepted. The German [13] and French [14] adaptations of this instrument were employed. Norms are provided by a sample of 194 female German high school students with a mean age of 16.2 years [13].

Questionnaire of Body Experience (FBeK): The FBeK [15] is a reliable and valid measure for analyzing people's attitude and awareness of their own bodies. It consists of 52 statements that can be answered with 'true' or 'false', and generates four scales. Scale 1 (attractivity/self-esteem) shows the degree of insecurity in a person, scale 2 (accentuation of physical appearance) a possible oversensitivity of patients about their own bodies. An elevated scale 3 (insecurity) indicates a negative assessment of one's body, and scale 4 (physical-sexual discomfort) describes sexual discontent and aspects of shame.

The socioeconomic status was calculated by means of a 6-point score of both paternal occupation and maternal education [16]. The three social classes were defined as follows: Scores 2–5, social class I (lowest); scores 6–8, social class II, and scores 9–12, social class III (highest).

Procedure

The interviews were conducted at the University Children's Hospital in Zürich for the German-speaking patients (D.A.B.), and at the

University Hospital in Geneva for the French-speaking patients (R.W.). On average, the one-time evaluation took 2 h. The ethical committees of both University Departments of Pediatrics approved the study.

Statistical Analyses

The obtained data were analyzed using standard statistical procedures. On the CBCL and the FBeK the patients' mean T-scores were compared with the T-scores of the age- and gender-matched norm group, using t tests. With the EPI the raw scores were used. Pearson correlations were computed to analyze possible links of the medical and sociodemographic data with the scales of the three questionnaires. Finally, multiple regression analysis was employed to corroborate the data obtained from the correlations and to analyze the influence of predictors on dependent variables.

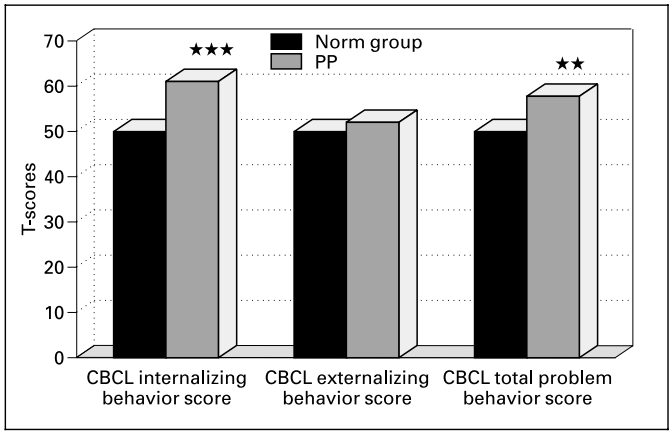

Fig. 1. Child Behavior Checklist (CBCL): comparison with norm group (mean = 50, SD = 10). ** $p < 0.01$; *** $p < 0.001$).

Results

Experience of PP and Medical Treatment

Answers from the interview showed a high general satisfaction with the pediatricians' care of patients (95%), even though 53% experienced great fear before the consultations. Recommendations to other patients with PP included to follow the pediatrician's advice (47%), not to dramatize the situation (47%), not to be fearful (32%), not to withdraw (26%) and not to have feelings of guilt (21%). Parents of patients emphasized the importance of good communication with their child (79%), and warned about preferential treatment of patients compared to siblings (58%).

The emotional impact is shown in table 2. Feelings of shame and insecurity were frequent among the patients, mostly because of tallness and breast development. 73% at times felt older or more mature than their peers. 68% reacted with frequent or occasional withdrawal. 47% of the patients and an equal percentage of parents had fears of short final stature. At present, however, 74% of the former patients are satisfied with their stature.

Table 2. Emotional and physical aspects during treatment (n = 19)

Feelings of insecurity	63%
Feelings of shame	47%
Feeling more mature	
Always	26%
Often	21%
Sometimes	26%
Withdrawal	
Frequent	21%
Occasional	63%
Most evident differences to peers	
Tallness	42%
Maturity	32%
Breast development	26%
Frequency of remarks about sexual characteristics by peers	
Often	32%
Sometimes	16%
Never	53%
Fears of short final stature	47%
Satisfaction with present stature	74%

Psychological Adjustment

On the CBCL – as completed by the parents – the Internalizing and the Total Problem Behavior scores were significantly higher than those of matched controls provided by the literature (fig. 1). The Externalizing scale was not elevated. On the EPI none of the scales were outside the norm, except for the Lie scale which was significantly higher (3.5 vs. 2.6 items in the norm group, $t = 3.1$; $p < 0.01$). This indicates that some of the patients had a tendency to present themselves as socially desirable and acceptable. On the FBeK none of its four scales were significantly elevated. This indicates that PP did not reduce the physical self-esteem, or increase the insecurity and physical discomfort of the patients.

Predictors of Psychological Adjustment

Pearson correlations (table 3) indicated that a relatively late onset of PP is an important predictor of problems in psychological adjustment. It was significantly associated with higher Total Problem Behavior scores (CBCL),

Table 3. Pearson correlation between sociodemographic variables and psychological measures

Measures	Age at onset of PP	Adult stature
CBCL		
Total problem behavior score	0.52*	−0.54*
Internalizing behavior scale	0.44	−0.47*
Externalizing behavior scale	0.37	−0.40
EPI		
Extraversion scale	0.08	0.06
Neuroticism scale	0.54*	−0.30
Lie scale	−0.43	0.22
FBeK		
Accentuation of physical appearance scale	0.71***	−0.27
Insecurity/concerns scale	0.49*	0.16

* $p < 0.05$; *** $p < 0.001$.

elevated Neuroticism scales (EPI), and elevated Accentuation of Physical Appearance and Insecurity/Concerns scales (FBeK). Another predictor was short adult stature, which was significantly correlated with elevated Total Problem Behavior and Internalizing scores on the CBCL.

In spite of the wide age range of our patients, the age at the time of the interview was not found to be a significant factor in any of the outcome measures. Multiple regression analysis showed that the independent variables 'age at onset of puberty' and 'present height' were able to predict 52% of the variance in the Total Problem Behavior score of the CBCL (multiple $R = 0.72$, $p < 0.01$). Both variables contributed with a significant β weight ($p < 0.01$). These results confirmed the importance of 'age at onset of precocious puberty' and 'present height' as powerful predictors for problem behavior at follow-up.

Discussion

Experience of PP

This study clearly showed that PP is a stressor in the lives of the young patients. As they became aware of the physical differences to their peers, feelings of insecurity were prominent. These differences were not just limited to the physical aspects, but existed on the level of psychological maturity as well. Most patients at times felt more mature than their peers. Many reacted to their role of being an outsider by withdrawal behavior.

Psychological Adjustment

The patients in the present study showed an overall increase of behavior problems. Furthermore, feelings of depression and anxiety were common, even several years after termination of therapy. They tended to be shy, lonely, and often feel inferior, moody or sad. Our findings are less dramatic than those of Sonis et al. [5]. None of our patients had a Total Problem Behavior score above the 98th percentile, as compared to 27% in their report. This difference may be due to the inclusion of patients with organic PP into their study population. Our retrospective findings are comparable to those of Xhrouet-Heinrichs et al. [4] and Galatzer and Laron [17]. However, their studies were performed during the patients' therapy. The striking similarity indicates that PP has persistent behavioral effects which are still detectable even years after termination of therapy.

The causes of the elevated Problem Behavior scores are discussed by Ehrhardt et al. [6] who interpreted their similar findings of behavioral problems as possible consequences of psychological stress caused by PP. These problems do not appear to be a result of medical treatment, since therapy was not experienced as traumatic, but rather of PP itself. In fact, a study comparing treated with untreated patients showed no significant differences between the two groups [7]. Puberty is a critical period in a person's development, and problems readily arise when onset and tempo of puberty are different from peers. Studies dealing with maturational timing within the normal range revealed an increase in conduct and adjustment problems for both early maturing [18–20] and, less frequently, for late maturing girls [21]. If PP is looked upon as an extreme form of early maturation, a higher incidence of behavior problems is therefore to be expected.

PP often extends over a long period from the clinical onset to the end of treatment, 6 years on average in the present study. Patients sense their physical difference to peers for which they are brought to medical attention. These are reasons for a strong desire to be just like their peers which explains the elevated Lie scale on the EPI, reflecting the patients' tendency to present themselves as socially acceptable. Similar findings were reported by Xhrouet-Heinrichs et al. [4] who found significantly increased Social Desirability scores on the Self-Esteem Inventory in more than one third of their patients. This was interpreted as an attempt to remain unnoticed, as a defense mechanism against uncomfortable feelings. In view of this attitude of appearing in a good light and not wanting to disappoint, the high degree of satisfaction with medical treatment found in the present study could be

somewhat inflated. This applies also to the discrepancy between elevated CBCL scores (as completed by the parents) and the normal results of the other two tests (as completed by the patients).

Predictors

Two factors appear to have a major influence on behavioral and emotional problems: adult height and age at onset of puberty. These two variables alone explain 52% of the variance in the Total Problem Behavior score of the CBCL. In the present study, short stature is clearly associated with a significantly higher incidence of problem behavior, although the mean height of our sample was within normal limits. Apter et al. [22] found more psychiatric diagnoses among adolescents with short stature. Other studies evaluating short normal children confirm that short stature can be a stressor. They found increased behavioral problems [23, 24] and emotional distress [25] among short-statured children. However, others came up with no differences in behavior or self-esteem [26].

The second factor, the age at onset of puberty, shows a wide array of negative consequences. This one variable has an influence on behavioral problems, emotional instability as well as physical concerns and insecurities. Affective instability in adolescence is consistent with the results of Money and Walker [9]. In a previous study the importance of the age at onset of PP had already been stressed – but quite differently [27]. The authors argued that since older children with PP are better able to understand the maturational processes than younger ones, they can more successfully cope with the situation. It was expected that their outcome would be better. Our findings indicate just the opposite, and are in clear contrast to the majority of the few corresponding studies: the older the patient is at onset of PP the more problem behavior is found. It can be hypothesized that the earlier the onset of PP, the better for the child, because a pre-school child is less aware of the full extent of the psychosocial implications of PP. As a result it will have fewer adjustment problems later in life. On the other hand, children with onset of PP at early school age are often exposed to the socially stigmatizing actions from their peers.

Limitations

Some limitations of this study merit note. First, the sample size of 19 and the wide age range allow only limited statements about the whole population of patients with PP. Second, this is not a longitudinal prospective, but a retrospective study. Patients had terminated therapy several years prior to the time of the interviews, raising some questions about the reliability of answers pertaining to the time of treatment. Third, the elevated scores on the Lie scale of the EPI indicate that some patients tried to present themselves in a good light, which may bear on the validity of the instruments used.

Clinical Consequences

Importantly, the following implications for clinical practice can be inferred from this study. In view of the significant impact of PP on behavior and emotions, it is suggested that patients are offered the option of psychological support, especially those with relatively late onset of puberty and those with predicted short adult height. There is evidence that those children who cannot openly communicate with their parents about their physical maturation are more likely to develop emotional problems [28]. Therefore an integral part of the psychological support should focus on helping children and parents to create an atmosphere where they can freely articulate concerns regarding PP. Appropriate means may be family therapy or individual counseling.

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References

1 Heger S, Partsch CJ, Sippell WG: Long-term outcome after depot gonadotropin-releasing hormone agonist treatment of central precocious puberty: Final height, body proportions, body composition, bone mineral density, and reproductive function. J Clin Endocrinol Metab 1999;84:4583–4590.

2 Ehrhardt AA, Meyer-Bahlburg HFL: Idiopathic precocious puberty in girls: Long-term effects on adolescent behavior. Acta Endocrinol Suppl 1986;279:247–253.

3 Galatzer A, Beth-Halachmi N, Kauli R, Laron Z: Intellectual function of girls with precocious puberty. Pediatrics 1984;74:246–249.

4 Xhrouet-Heinrichs D, Lagrou K, Heinrichs C, Craen M, Dooms L, Malvaux P, Kanen F, Bourguignon JP: Longitudinal study of behavioral and affective patterns in girls with central precocious puberty during long-acting triptorelin therapy. Acta Paediatr 1997;86:808–815.

5 Sonis WA, Comite F, Blue J, Pescovitz OH, Rahn CW, Hench KD, Cutler GB, Loriaux LD, Klein RP: Behavior problems and social competence in girls with true precocious puberty. J Pediatr 1985;106:156–160.

6 Ehrhardt AA, Meyer-Bahlburg HFL, Bell JJ, Cohen SF, Healey JM, Stiel R, Feldman JF, Morishima A, New M: Idiopathic precocious puberty in girls: Psychiatric follow-up in adolescence. J Am Acad Child Psychiatry 1984;23:23–33.

7 Schoevaart CE, Drop SLS, Otten BJ, Slijper FME, Degenhart HJ: Growth analysis up to final height and psychosocial adjustment of treated and untreated patients with precocious puberty. Horm Res 1990;34:197–203.

8 Solyom AE, Austad CC, Sherick I, Bacon GE: Precocious sexual development in girls: The emotional impact on the child and her parents. J Pediatr Psychol 1980;5:385–393.

9 Money J, Walker PA: Psychosexual development, maternalism, nonpromiscuity, and body image in 15 females with precocious puberty. Arch Sex Behav 1971;1:45–60.

10 Achenbach T: Manual for the Child Behavior Checklist/4–18. Burlington, University of Vermont, 1991.

11 Arbeitsgruppe Deutsche Child Behavior Checklist: Elternfragebogen über das Verhalten von Kindern und Jugendlichen (CBCL/4–18). 2. Auflage mit deutschen Normen, bearbeitet von M. Döpfner, J. Plück, S. Bölte, K. Lenz, P. Melchers, K. Heim. Köln, Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik, 1998.

12 Eysenck HJ: The Eysenck Personality Inventory. London, University of London, 1964.

13 Eggert D: Eysenck-Persönlichkeits-Inventar EPI: Handanweisung, ed. 2. Göttingen, Hogrefe, 1983.

14 Eysenck HJ: Inventaire d'Eysenck de personnalité: Manuel. Paris, Edition du centre de psychologie appliquée, 1971.

15 Strauss B, Richter-Appelt H: Fragebogen zur Beurteilung des eigenen Körpers (FBeK): Handanweisung. Göttingen, Hogrefe, 1996.

16 Largo RH, Molinari L, Comenale Pinto L, Weber M, Duc G: Language development of term and preterm children during the first five years of life. Dev Med Child Neurol 1986;28:333–350.

17 Galatzer A, Laron Z: Behavior in girls with true precocious puberty. J Pediatr 1986;108:790–791.

18 Magnusson D, Stattin H, Allen VL: Biological maturation and social development: A longitudinal study of some adjustment processes from midadolescence to adulthood. J Youth Adolesc 1985;14:267–283.

19 Orr DP, Ingersoll GM: The contribution of level of cognitive complexity and pubertal timing to behavioral risk in young adolescents. Pediatrics 1995;95:528–533.

20 Simmons RG, Blyth DA: Moving into Adolescence: The Impact of Pubertal Change and School Context. Hawthorne/NY, de Gruyter, 1987.

21 Nottelmann ED, Susman EJ, Inoff-Germain G, Cutler GB, Loriaux DL, Chrousos GP: Developmental processes in early adolescence: Relationships between adolescent adjustment problems and chronologic age, pubertal stage, and puberty-related serum hormone levels. J Pediatr 1987;110:473–480.

22 Apter A, Galatzer A, Weizman A, Weizman T, Modai I, Laron Z: Psychological aspects of developmental endocrinopathies in adolescence. Isr J Psychiatry Relat Sci 1994;4:246–253.

23 Sandberg DE, Brook AE, Campos SP: Short stature: A psychosocial burden requiring growth hormone therapy? Pediatrics 1994;94:832–840.

24 Stabler B, Clopper RR, Siegel PT, Stoppani C, Compton PG, Underwood LE: Academic achievement and psychological adjustment in short children: The national cooperative growth study. J Dev Behav Pediatr 1994;15:1–6.

25 Zimet GD, Owens R, Dahms W, Cutler M, Litvene M, Cutler L: Psychosocial outcome of children evaluated for short stature. Arch Pediatr Adolesc Med 1997;151:1017–1023.

26 Downie AB, Mulligan J, Stratford RJ, Betts PR, Voss LD: Are short normal children at a disadvantage? The Wessex growth study. BMJ 1997;314:97–100.

27 Mouridsen SE, Larsen FW: Psychological aspects of precocious puberty: An overview. Acta Paedopsychiatr 1992;55:45–49.

28 Ehrhardt AA, Meyer-Bahlburg HFL: Psychosocial aspects of precocious puberty. Horm Res 1994;41(suppl 2):30–35.